

# OmicStudio: a composable high-quality bioinformatics cloud platform

Fengye Lyu\*, Feiran Han, Changli Ge, Weikang Mao, Li Chen, Qunli Wang, Huipeng Hu, Guoguo Chen, Qiulei Lang, Chao Fang\*.

LC-Bio Technology Co., Ltd., Hangzhou, China



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# Abstract

## ● Bioinformatic Cloud Platform in the past decade:

1. [Qiita](#)
2. [EasyMAP](#)
3. [MG-RAST](#)
4. [gcMeta](#)
5. [ETCM](#)
6. [Sangerbox](#)
7. [antiSMASH](#)
8. [EVENN](#)
9. [Majorbio Cloud](#)

**BRIEF COMMUNICATION** nature|methods  
https://doi.org/10.1038/s41592-018-0141-9

Contents lists available at ScienceDirect  
New BIOTECHNOLOGY  
biome

**BMC Bioinformatics**  
BioMed Central  
Open Access

Published online 26 October 2018  
Nucleic Acids Research, 2019, Vol. 47, Database issue D637–D648  
doi: 10.1093/nar/gky1008  
**ic resource for the analysis of metagenomes**  
n<sup>1</sup>, EM Glass<sup>1</sup>, M Kubal<sup>2</sup>,  
J Wilkening<sup>1</sup> and

**gcMeta: a Global Catalogue of Metagenomics platform to support the archiving, standardization and analysis**  
Published online 26 October 2018  
D976–D982 Nucleic Acids Research, 2019, Vol. 47, Database issue  
doi: 10.1093/nar/gky987

**ETCM: an encyclopaedia of traditional Chinese medicine**  
DOI: 10.1002/imt2.36  
Hai-Yu Xu<sup>1,2,\*†</sup>, Ya  
Shi-Huan Tang<sup>1</sup>, X  
Hong-Jun Yang<sup>1,\*</sup>

**iMeta** WILEY  
COMMENTARY

Published online 29 April 2019  
Nucleic Acids Research, 2019, Vol. 47, Web Server issue W81–W87  
doi: 10.1093/nar/gkz310  
**Sangerbox: clinical bioinformatics platform for antimicrobial resistance genomics**

**antiSMASH 5.0: updates to the secondary metabolite genome mining tool**  
Kai Blin<sup>1</sup>, Simon Sha  
Yup Lee<sup>1,3</sup>, Marnix H.

**Journal of Genetics and Genomics**  
Journal homepage: www.journals.elsevier.com/journal-of-genetics-and-genomics  
JGG

Letter to the editor  
**EVENN: Easy to create Venn networks online**

**iMeta** WILEY  
COMMENTARY

**Majorbio Cloud: A one-stop, comprehensive bioinformatic platform for multiomics analyses**

These platforms have greatly promoted the research of biology, medicine and metagenomics, providing new perspectives for big data research.

# Abstract

- Independent tool type cloud analysis

- Provides cloud analytics for complete analysis process types

**nature protocols** **PROTOCOL**  
<https://doi.org/10.1038/s41596-020-00444-7>  
Check for updates

**High-throughput cultivation and identification of bacteria from the plant root microbiota**

**Recovery of high-quality Genomes from a deep-inland Salt Lake Using BASALT**

Review Article **Chinese Medical Journal\***

**A guide to human microbiome research: study design, sample collection, and bioinformatics analysis**

Xu-Bo Qian<sup>1</sup>, Tong Chen<sup>2</sup>, Yi-Ping Xu<sup>1</sup>, Lei Chen<sup>3</sup>, Fu-Xiang Sun<sup>4</sup>, Mei-Ping Lu<sup>1</sup>, Yong-Xin Liu<sup>5,6</sup>

Wu<sup>1</sup>,  
n<sup>10</sup>, Fan  
huang<sup>17</sup>

**PsRobot: a web-based plant small RNA meta-analysis toolbox**

APPLICATION NOTE **id Xiu-Jie Wang<sup>1,\*</sup>**

**mLife** **gcCov: Linked open data for global coronavirus studies**

Wenyu Shi<sup>1</sup>, Guomei Fan<sup>1</sup>, Zhihong Shen<sup>2</sup>, Chuan Hu<sup>2</sup>, Juncai Ma<sup>1,3</sup>, Yuanchun Zhou<sup>2</sup>, Zhen Meng<sup>2</sup>, Songnian Hu<sup>1,3</sup>, Yuhai Bi<sup>4</sup>, Liang Wang<sup>4</sup>, Haiying Yu<sup>1,3</sup>, Siru Lin<sup>1</sup>, Xiuqiang Sun<sup>1</sup>, Xinjiao Zhang<sup>1</sup>, Dongmei Liu<sup>1</sup>, Qian Sun<sup>1,4</sup>, and Linhuan Wu<sup>1,3,\*</sup>

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Corrected: Author Correction

**Reproducible, interactive, scalable and extensible microbiome data science using QIIME 2**

**A practical guide to amplicon and metagenomic analysis of microbiome data**

Contents lists available at ScienceDirect  
**Engineering Microbiology**  
ELSEVIER journal homepage: [www.elsevier.com/locate/engmic](http://www.elsevier.com/locate/engmic)

Original Research Article

A comparative study on the genomes, transcriptomes, and metabolic properties of *Escherichia coli* strains Nissle 1917, BL21(DE3), and MG1655

Methodology | Open Access | Published: 16 February 2022

**METABOLIC: high-throughput profiling of microbial genomes for functional traits, metabolism, biogeochemistry, and community-scale functional networks**

**Sequence-based Functional Metagenomics Reveals Novel Natural Diversity of Functioning CopA in Environmental Microbiomes**

**SOFTWARE ARTICLE** Open Access

**PathoFact: a pipeline for the prediction of virulence factors and antimicrobial resistance genes in metagenomic data**

Laura de Nies<sup>1</sup>, Sara Lopes<sup>1</sup>, Susheel Bhanu Busi<sup>1</sup>, Valentina Galata<sup>1</sup>, Anna Heintz-Buschart<sup>1,2,3</sup>, Cedric Christian Laczny<sup>1</sup>, Patrick May<sup>4</sup> and Paul Wilmes<sup>1\*</sup>

The main highlight of these cloud platforms is turning complex coding into easy-to-use web-based tools.

# Abstract

- **Problems existing in various cloud analysis platforms and tools:**

The purpose of their development is to simplify the operation

process. It is often assumed that **users have sufficient knowledge**

**of biological information knowledge when operating**, but it is

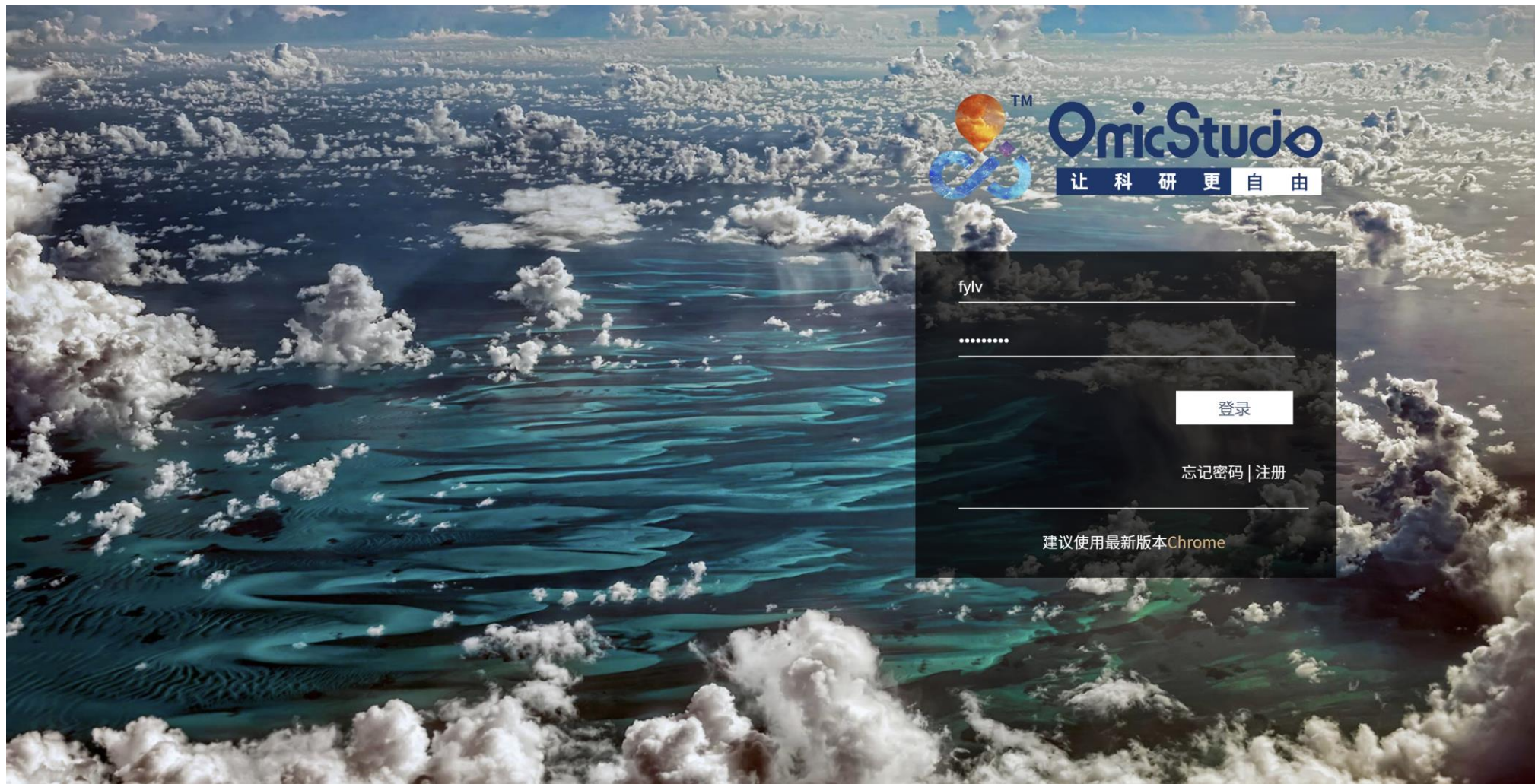
often ignored that **the real use scenario** is that **users are learning**

**while using, and expect to obtain published level charts through**

**easy operation.**

# Introduction

- OmicStudio Web (<https://www.omicstudio.cn/>)



# Introduction

## ● Features of OmicStudio Cloud:

- A **one-stop online analysis platform** providing high-throughput omics data analysis, as well as an **exploratory** platform for bioinformatics research;
- Be able to obtain results rapidly, generate high-quality graphs for publication, and connect with downstream analysis module automatically, focuses on **speed, quality** together with **flexibility**;
- Can not only meet the users' demand of **ordinary** bioinformatics data analysis, statistics and visualization, but also provides them freedom of **data mining** beyond developer's framework
- Unlimited to developer's aesthetics, users can get more elegant graphs through **customizing**

# Introduction

- In terms of website framework, OmicStudio has common configuration that all bioinformatics cloud platform may have, such as Cloud Tools, Cloud Analysis, Omics Courses and Study Materials Center, **providing entire bioinformatics service** for users. Since its establishment in early 2019, OmicStudio already attracted over 30,000 users, helped whom publish more than 200 research papers, involving various “-omics” fields. An **easy-to-use** platform which can generate **high-quality results** is obviously able to make great contribution to scientific research.
- This section describes the features and application scenarios of each module in detail.

# Results

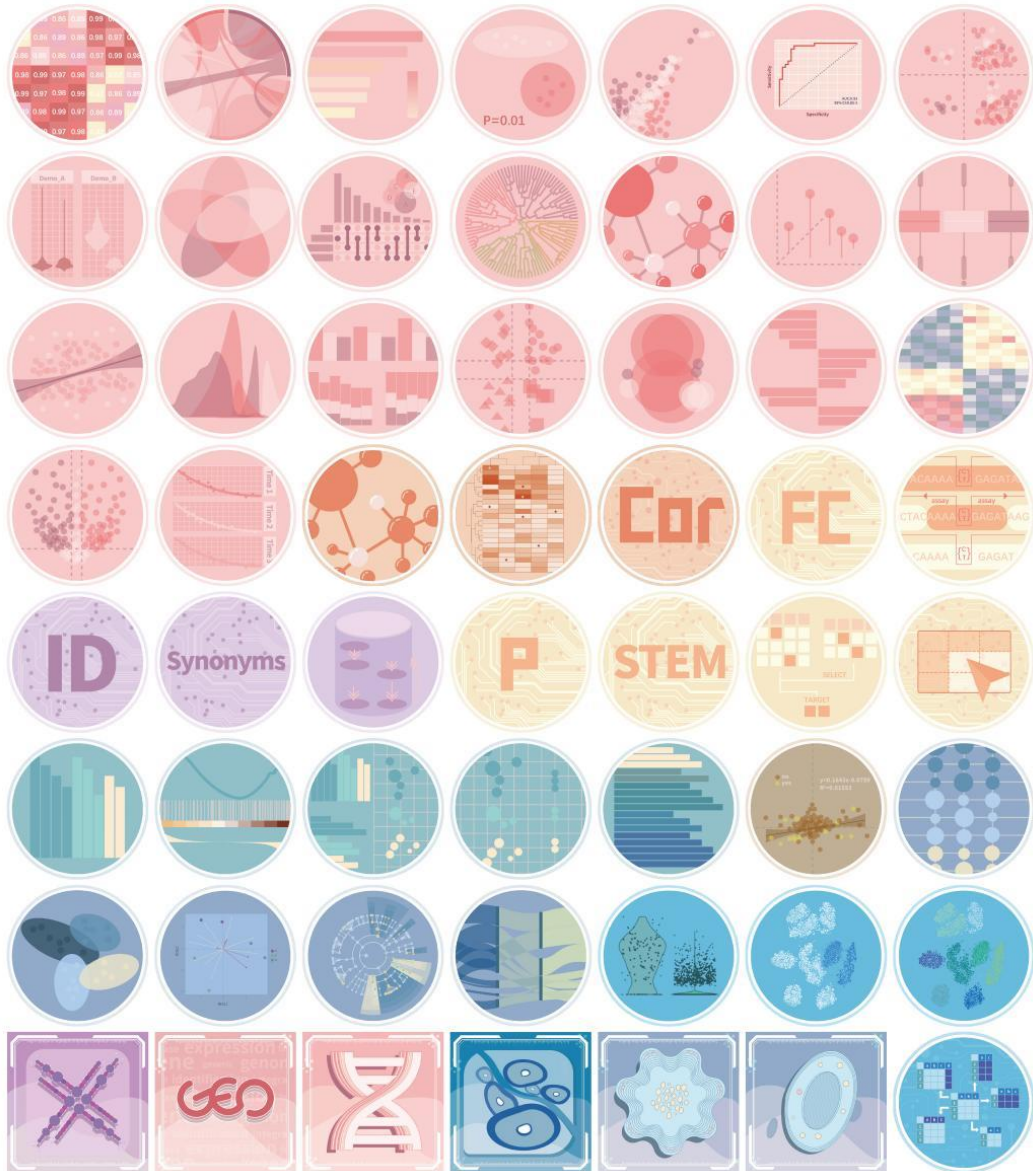
- OmicStudio consists of six modules, named Cloud Tools, Cloud Analysis, Cloud Classroom, Study Materials Center, User's Paper Collection and User Center:
  - **Cloud Tools** and **Cloud Analysis** are the main part of the function for bioinformatics analysis.
  - **Cloud Classroom** and **Study Materials** Center help users understand and learn bioinformatics.
  - **User's Paper Collection** collects the papers published in cooperation with LCBIO and users can take them as reference.
  - **User Center** is an integrated management module for user's project information.

# Results

## The core functions of the cloud platform are cloud tools and cloud analytics

- Main Difference: **Cloud tools focus on short, fast analysis; Cloud analytics can support time-consuming analysis and have a project management backend:**
  - the analysis with large amount of data and complex calculation needs to be able to run in the background so that users can leave the web page and do their own thing.
  - Simple analytics require instant results and can be personalized immediately.
  - Based on this consideration, the module design can allow users to obtain the most comfortable experience in different application scenarios.
- **Other modules serve these two core modules:**
  - Cloud Classroom and Study Materials Center provide the basic knowledge of run bioinformatics analysis in the form of video and text respectively.
  - User Center manages the analysis results
  - User's Paper Collection provide new users with reference for writing articles.

# Results



- Icons show the character of tools:

- Colors represent omics

pink: universal omics

blue: 10x single cell

green: enrichment analysis

yellow: analysis

purple: database

orange: correlation analysis

bluish violet: microbiome

dark blue: tumor;WES

- Shapes indicate tools or analysis

- **circle**: Tools, Focus on timely response and personalized adjustment;

- **square**: Analysis, Can run in the background, for a long time to generate information analysis

# Features

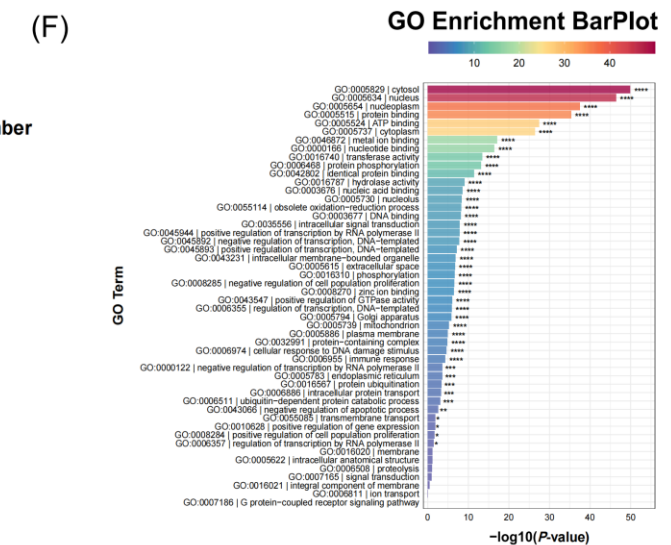
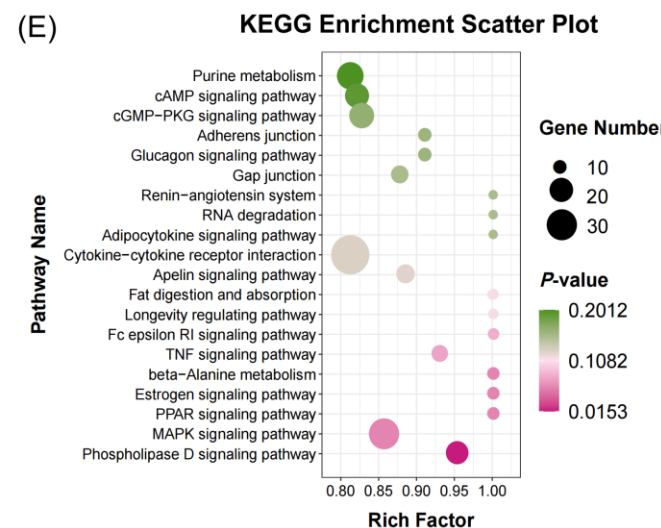
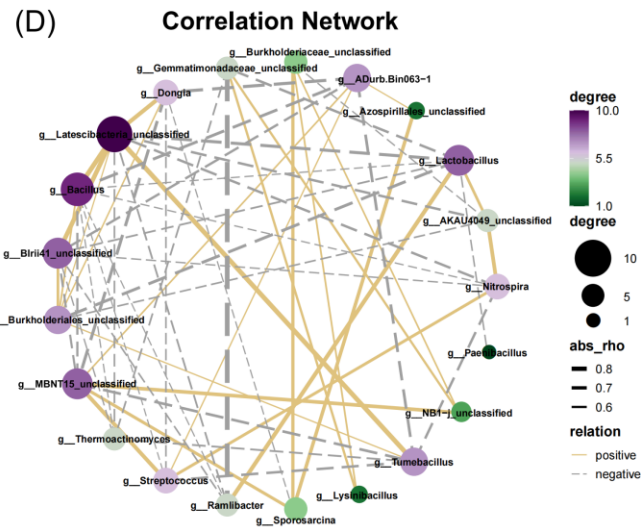
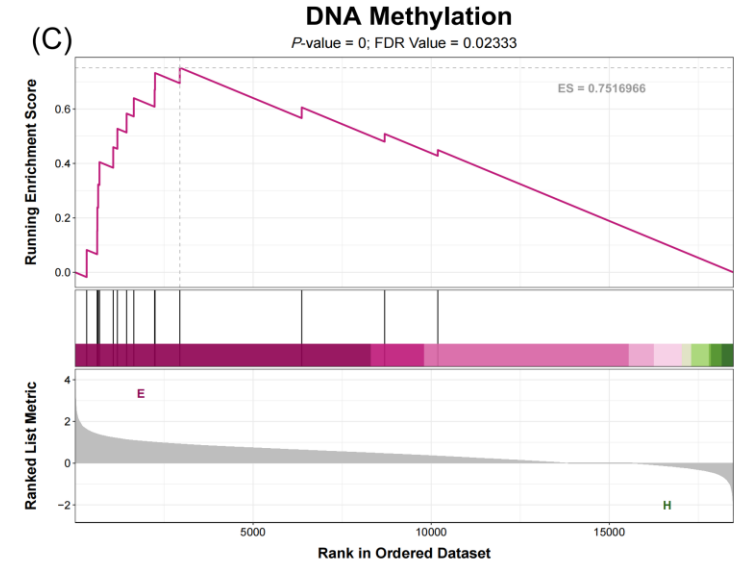
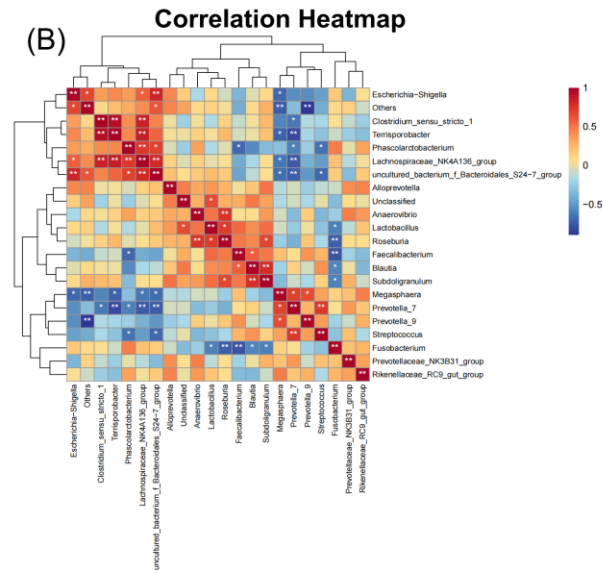
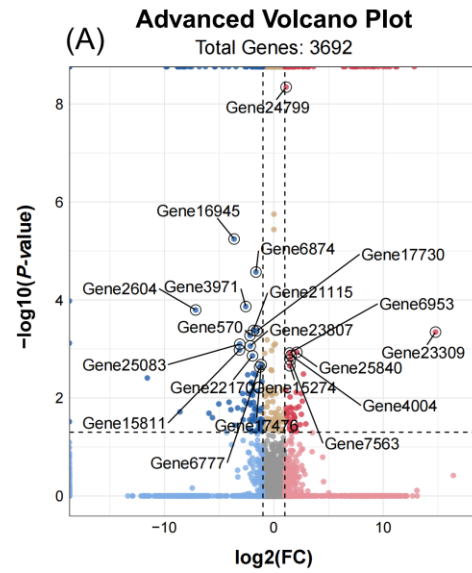
- **General bioinformatics platform development follows the logic of "first set parameters, then start analysis, and finally go to the background to view the results", which has the following problems:**
  1. The result is not timely feedback, novice in the process of familiar with the tool need to **switch back and forth**, both **inconvenient** and **boring**.
  2. For people who are not familiar with bioinformatics, they do not understand the corresponding relationship between parameters and results, and cannot match the desired effect in their mind with a specific parameter, so they either spend a lot of time to **learn the meaning of parameters unrelated to the goal**, or **spend a lot of time to repeat the above operation**.
  3. In the process of bioinformatic tool development, the **accommodation** of low threshold requirements leads to the **loss** of a large number of key bioinformatic parameter information for users and **limits** the development potential of the tool itself.

# Features

- To solve the above problems, OmicStudio cloud platform was developed with these principles:
  - Effect of Parameter Adjustment with **Real-Time** Feedback
  - Providing **Default Parameter, One Click Analyze**
  - **High-Quality** and **Free Adjustable** Analysis Results
  - Associate with **Downstream Analysis Module** Freely
  - Automatically **Save the Analysis Parameter**, Convenient to Backtrack
  - **Extra Resources** For Users

# Features

✓ can generate high-quality graphs for publication:



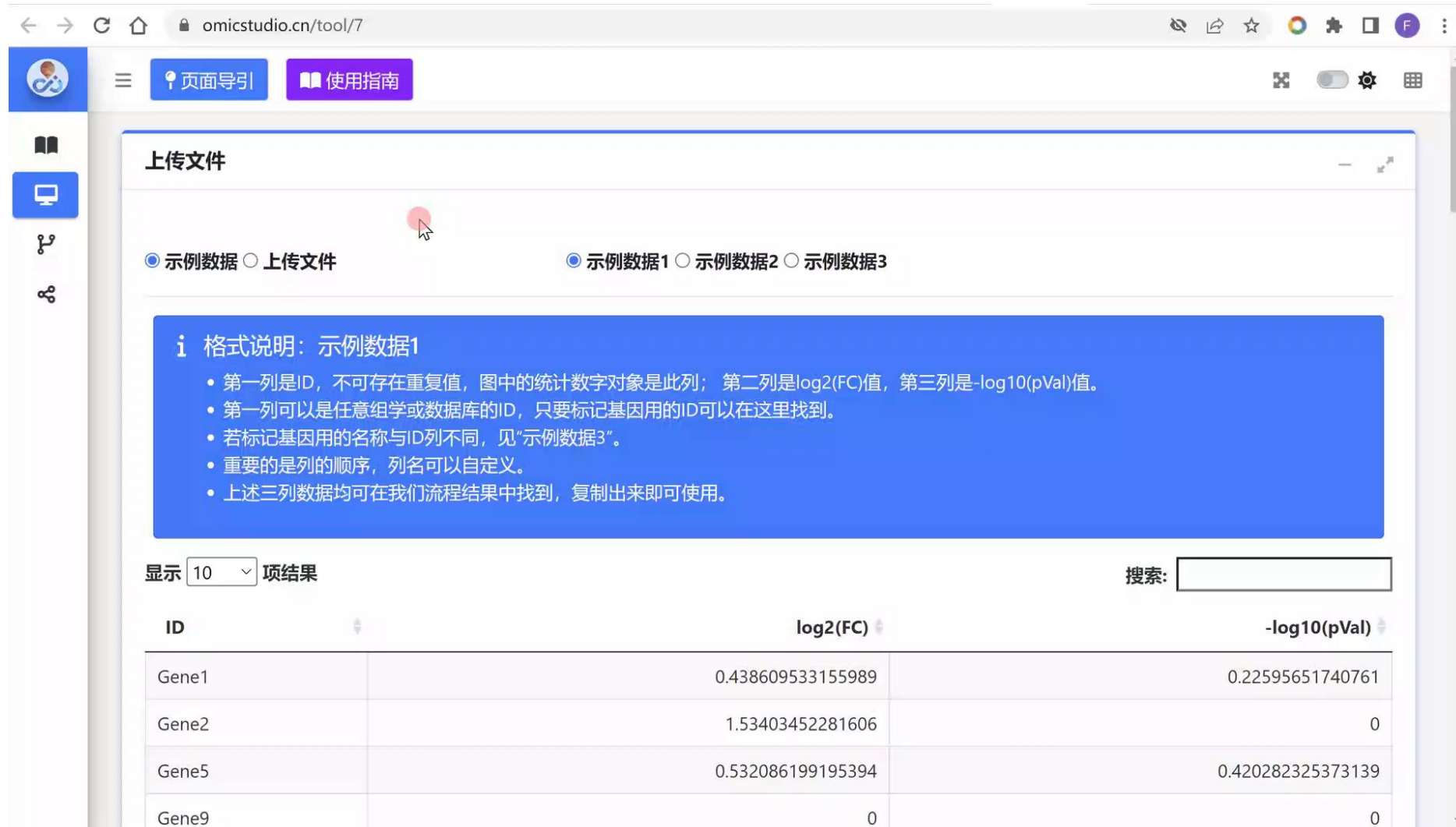
# Features

✓ providing various parameter for custom settings:

The screenshot displays the OmicStudio web interface. On the left, there is a sidebar with navigation icons. The main content area is divided into two panels. The left panel, titled '结果下载' (Result Download), contains a '打包下载' (Download Package) button, an '输出文件名' (Output File Name) field with the value 'Demo\_Heatmap', and an '输出图片类型' (Output Image Type) dropdown menu set to 'PNG: 600dpi, PDF'. The right panel, titled '结果展示' (Result Display), shows a 'Heatmap' visualization. The heatmap has a width of 21 and a height of 21. A color scale on the right ranges from -1 (red) to -6 (blue). The heatmap is labeled with various bacterial taxa on the right side, including Fusobacterium, Others, Streptococcus, Prevotella\_9, Lactobacillus, Megaspheara, Faecalibacterium, Subdoligranulum, Unclassified, Escherichia-Shigella, Lachnospiraceae\_NK4A136\_group, Terrisporobacter, Clostridium\_sensu\_stricto\_1, uncultured\_bacterium\_f\_Bacteroidales\_S24-7\_group, Phascolarctobacterium, Anaerovibrio, Blautia, Prevotella\_7, and Prevotellaceae\_NK3B31\_group. A status bar at the bottom indicates '正在等待 www.omicstudio.cn 的响应...' (Waiting for response from www.omicstudio.cn).

# Features

✓ providing default parameter, one click analyze:



The screenshot shows a web browser window with the URL `omicstudio.cn/tool/7`. The interface includes a navigation bar with '页面导引' and '使用指南' buttons. The main content area is titled '上传文件' and features radio buttons for '示例数据' (selected), '上传文件', '示例数据1', '示例数据2', and '示例数据3'. A blue information box provides format instructions for '示例数据1':

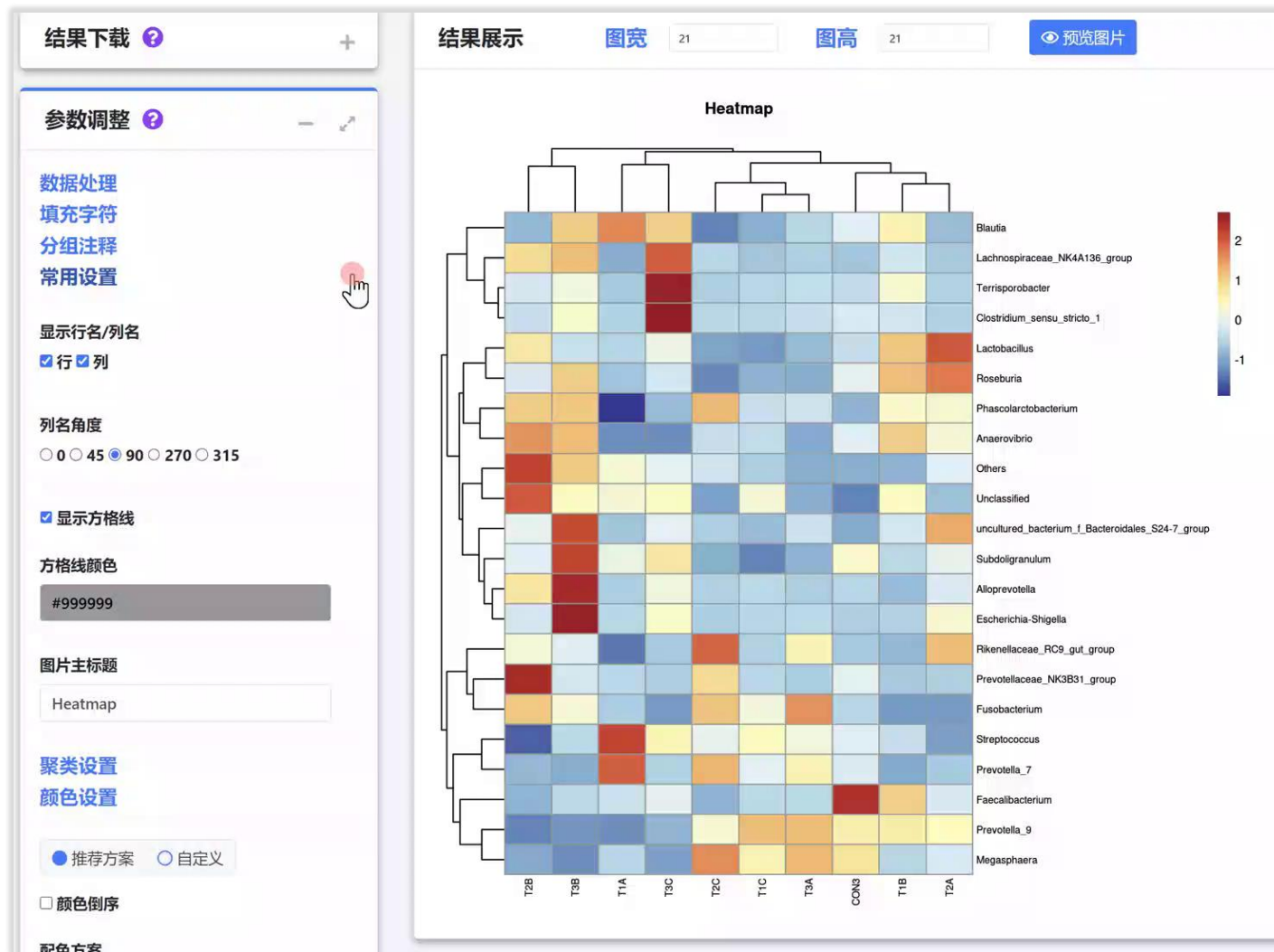
- 第一列是ID, 不可存在重复值, 图中的统计数字对象是此列; 第二列是 $\log_2(\text{FC})$ 值, 第三列是 $-\log_{10}(\text{pVal})$ 值。
- 第一列可以是任意组学或数据库的ID, 只要标记基因用的ID可以在这里找到。
- 若标记基因用的名称与ID列不同, 见“示例数据3”。
- 重要的是列的顺序, 列名可以自定义。
- 上述三列数据均可在我们流程结果中找到, 复制出来即可使用。

Below the instructions, there is a '显示 10 项结果' dropdown and a search box. A table displays the following data:

ID	$\log_2(\text{FC})$	$-\log_{10}(\text{pVal})$
Gene1	0.438609533155989	0.22595651740761
Gene2	1.53403452281606	0
Gene5	0.532086199195394	0.420282325373139
Gene9	0	0

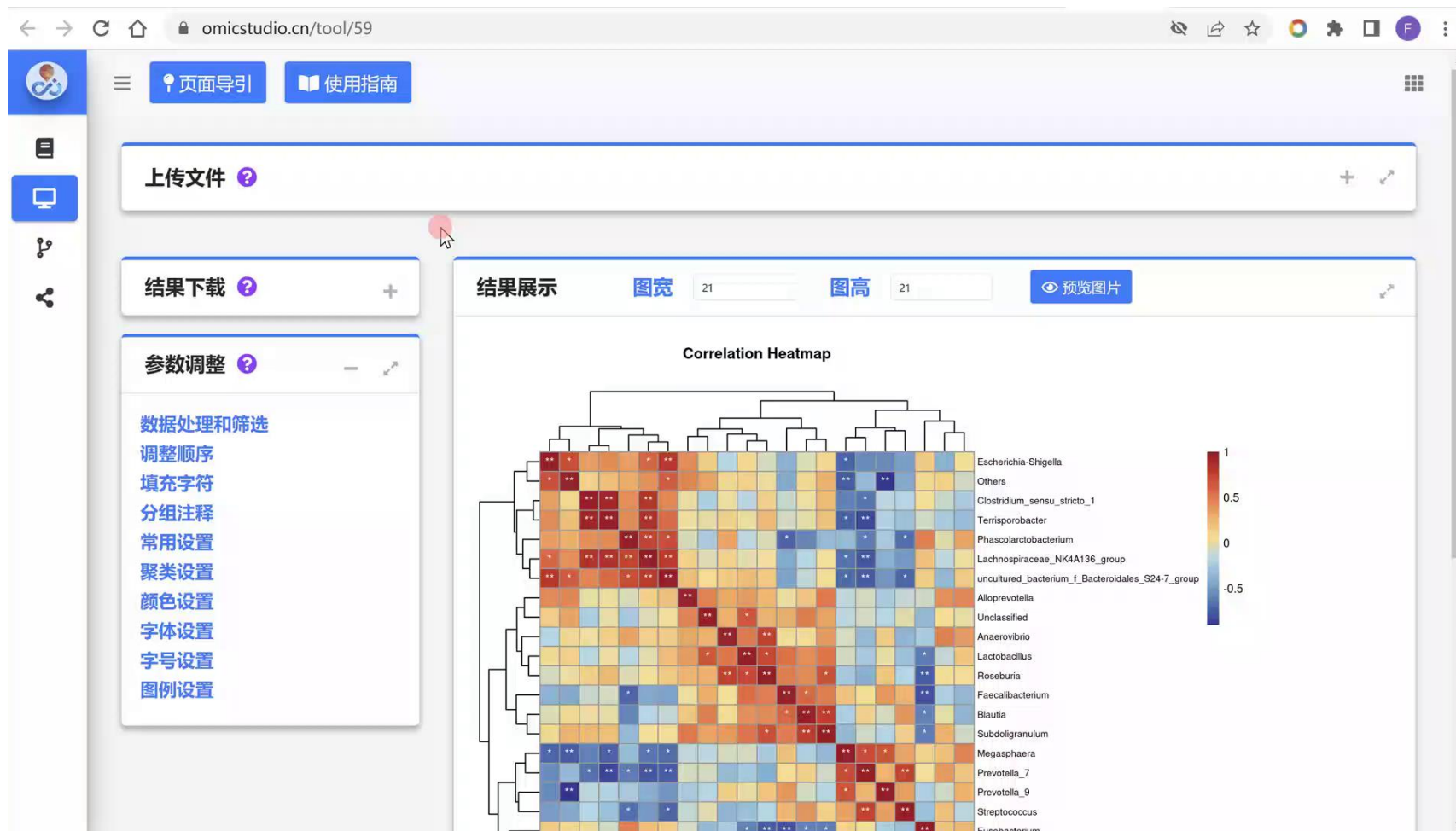
# OmicStudio特点

✓ effect of parameter adjustment with real-time feedback:



# OmicStudio特点

- ✓ associate with downstream analysis module freely
- ✓ automatically save the analysis parameter, convenient to backtrack



# OmicStudio特点

## ● Extra Resources For Users:

### ➤ Cloud Classroom Module

Including 9 themes and nearly 100 courses. It's convenient to focus on any course based on demand. The themes include bioinformatics, omics science knowledge and literature interpretation, aiming to meet all of the users' demand from understanding of biology to the learning of operation.

主题课精选 (20) 更多 >

<p>微生物人必备 科研作图技能训练营</p> <p>2023/1/6~1/8</p> <p>微生物人必备科研作图技能训练营</p> <p>¥1800</p>	<p>RNA测序R语言 生信启迪班PLUS版</p> <p>2022/12/13-12/16</p> <p>联川生物RNA测序R语言生信启迪班PLUS版...</p> <p>¥1800</p>	<p>微生物组学 “一站式”教学培训班</p> <p>正在报名</p> <p>2022/11/18/~11/20</p> <p>微生物组学“一站式”教学培训班</p> <p>¥1800</p>	<p>高质量单细胞文章必备分析 全流程培训班</p> <p>2022/11/8/~11/11</p> <p>高质量单细胞文章必备分析全流程培训班</p> <p>¥2000</p>
<p>转录调控专题</p> <p>转录调控绘图生信班第二期20221017</p> <p>¥1800</p>	<p>转录组云分析</p> <p>转录组云分析教程</p> <p>限时免费</p>	<p>微生物10+文章修炼手册培训班</p> <p>¥1800</p>	<p>单细胞&amp;空间多组学全流程实战系列精品课</p> <p>¥3900</p>

# OmicStudio特点

## ● Extra Resources For Users:

### ➤ User's Paper Collection Module

Collecting hundreds of research articles published by OmicStudio users, providing name of journal, year of publication, impact factor, source of sample, method used and other information. Users can search, preview and download pdf version of paper. It's convenient for users to acquire knowledge in interested field, and reproduce the analysis result by OmicStudio.。

发表时间	标题	期刊全称	CNS期刊	研究领域	样本来源	所用技术	搜索	重置	一键下载
年份	标题	期刊	影响因子	样本来源	所用技术	操作	收藏		
2022	Design of fast-onset antidepressant by dissociating SERT from nNOS in the DRN	Science	63.714	小鼠	转录组测序	阅读	★		
2022	Pre-ribosomal RNA reorganizes DNA damage repair factors in nucleus during meiotic prophase and DNA damage response	Cell Research	46.297	细胞	转录组测序, RNA-ChIP-seq	阅读	★		
2022	Circular RNA circFIRRE drives osteosarcoma progression and metastasis through tumorigenic-angiogenic coupling	Molecular Cancer	41.444	人	circRNA测序	阅读	★		
2022	RNA m6A regulates transcription via DNA demethylation and chromatin accessibility	Nature Genetics	41.307	人	m6A-seq, DNA甲基化测序 (RRBS), CUT, Tag	阅读	★		
2022	BCL-2 expression promotes immunosuppression in chronic lymphocytic leukemia by enhancing regulatory T cell differentiation and cytotoxic T cell exhaustion	Molecular Cancer	41.444	T细胞	单细胞转录组 (10x3')	阅读	★		
2022	Characterization of distinct circular RNA signatures in solid tumors	Molecular Cancer	41.444	人类	lncRNA测序, circRNA测序, 转录组测序	阅读	★		
2022	Treatment of SARS-CoV-2-induced pneumonia with NAD+ and NMN in two mouse models	Cell Discovery	38.079	小鼠	转录组测序	阅读	★		
2022	Targeting HECTD3-IKKα axis inhibits inflammation-related metastasis	Signal Transduction and Targeted Therapy	38.104	鼠	转录组测序	阅读	★		
2022	Dendritic cell-derived IL-27 p28 regulates T cell program in pathogenicity and alleviates acute graft-versus-host disease	Signal Transduction and Targeted Therapy	38.104	小鼠	单细胞转录组 (10x3')	阅读	★		
2022	FGF21 Alleviate Lower Limb Ischemia/Reperfusion: Involvement of TFE3-mediated Autophagy Restoration and Antioxidant Response in Microvascular Endothelial Cells	Signal Transduction and Targeted Therapy	38.104	小鼠	转录组测序	阅读	★		

# OmicStudio特点

## ● Extra Resources For Users:

### ➤ Information Center Module

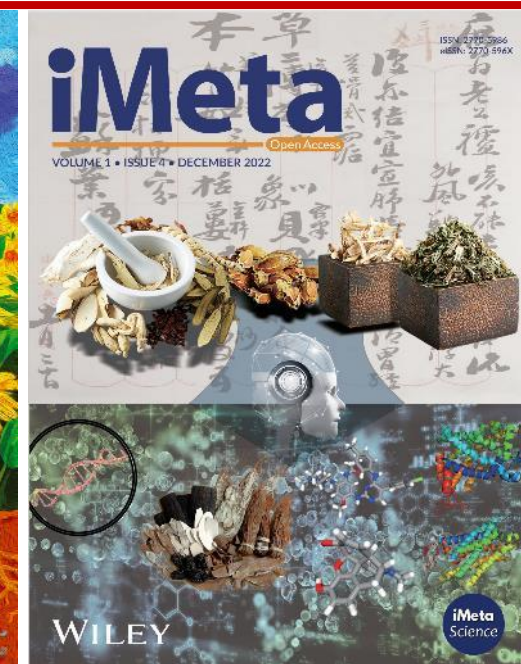
Common bioinformatic questions and their answers and solutions based on a large number of LC BIO's after-sales business are shared on this page for the convenience of users.

标题	类别	标签	浏览次数	更新时间	作者	点赞	收藏
<a href="#">windows下如何进行MD5校验</a>	项目资料	通用组学	8498	2021-06-03	张瑞静		
<a href="#">网络图云工具使用</a>	SOP		5499	2020-06-29	毛维康		
<a href="#">销售培训资料-降解组专题</a>	视频教程	降解组,销售培训资料	5118	2020-08-03	林亚君		
<a href="#">联川生物-有参转录组测序报告解读-20191105</a>	项目资料	报告解读	5117	2022-03-04			
<a href="#">B站直播: 进化树云工具</a>	视频教程	云平台讲解	4248	2021-01-18			
<a href="#">联川生物云平台-使用指南-GSEA</a>	项目资料	云平台	4047	2021-06-10	吕枫烨		
<a href="#">云平台形状选项</a>	SOP		3928	2019-08-14	吕枫烨		
<a href="#">云平台培训课程-2.KEGG富集因子图_吕枫烨20200709</a>	视频教程	云平台讲解,销售培训	3832	2020-08-03	林亚君		
<a href="#">LEfSe云工具操作手册</a>	SOP	微生物组	3613	2020-10-22			
<a href="#">实用流式细胞术彩色图谱</a>	书籍	内部共享,书籍	3451	2020-09-03	吕枫烨		

# Summary

- OmicStudio focuses on making scientific research more easily.
- Since October 2019, the services content of the platform has been upgraded and iterated over 1000 times.
- There are already more than 30,000 scientific research users.
- In the past 3 years, over 400 research articles cited OmicStudio (Google Scholar, by August 13, 2022).

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“***iMeta***” is an open-access Wiley partner journal launched by iMeta Science Society consist of scientists in bioinformatics and metagenomics world-wide. iMeta aims to promote microbiome, and bioinformatics research by publishing research, methods/protocols, and reviews. The goal is to publish high-quality papers (top 10%, IF > 15) targeting a broad audience. Unique features include video submission, reproducible analysis, figure polishing, APC waiver, and promotion by social media with 500,000 followers. Four issues were released in [March](#), [June](#), [September](#), and [December](#) 2022. Index by [Google Scholar](#), [Crossref](#), [Dimensions](#), [PubMed\(partial\)](#), [DOAJ](#) and [Scopus](#).



Society: <http://www.imeta.science>

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Submission: <https://mc.manuscriptcentral.com/imeta>



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